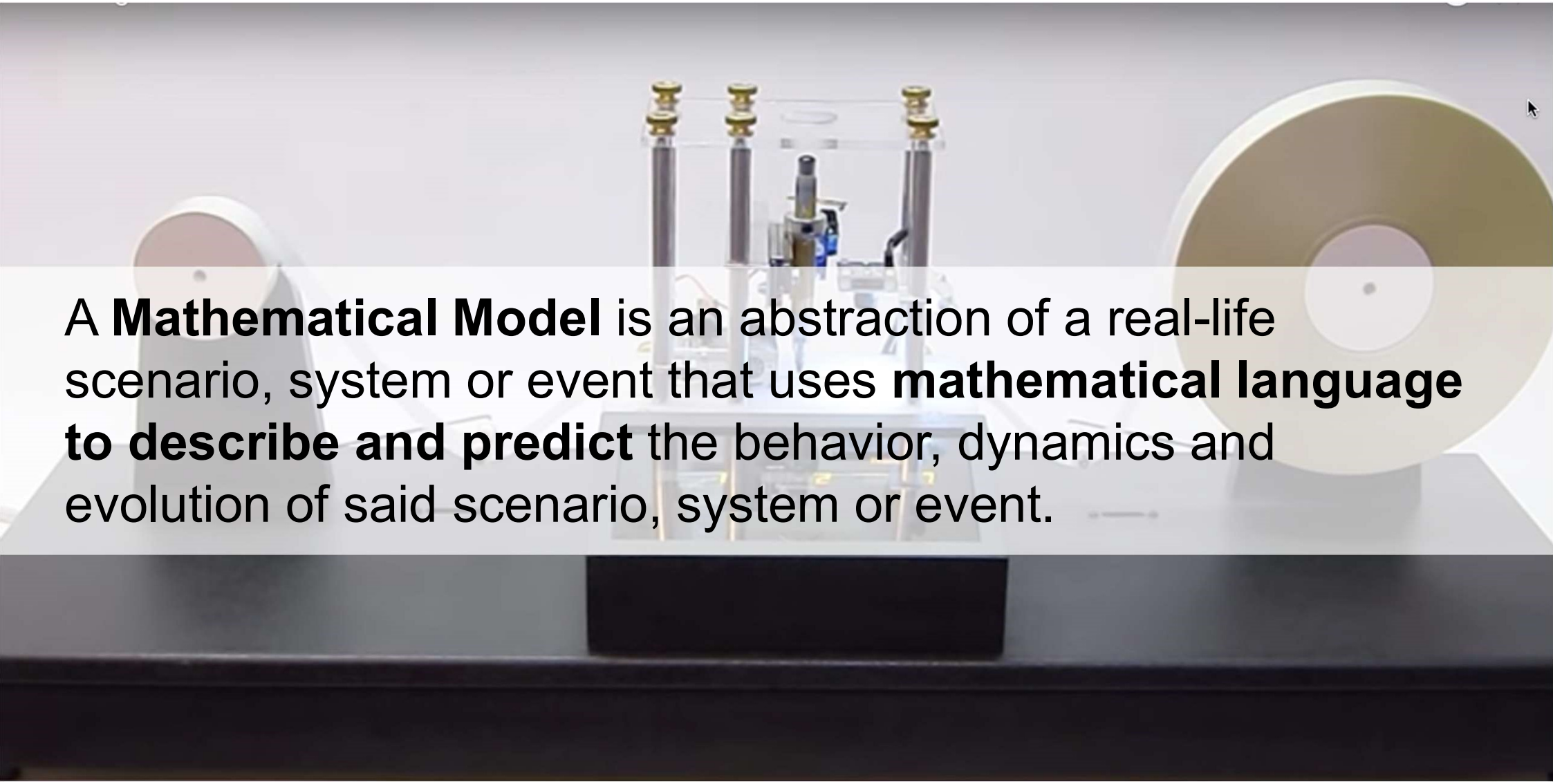
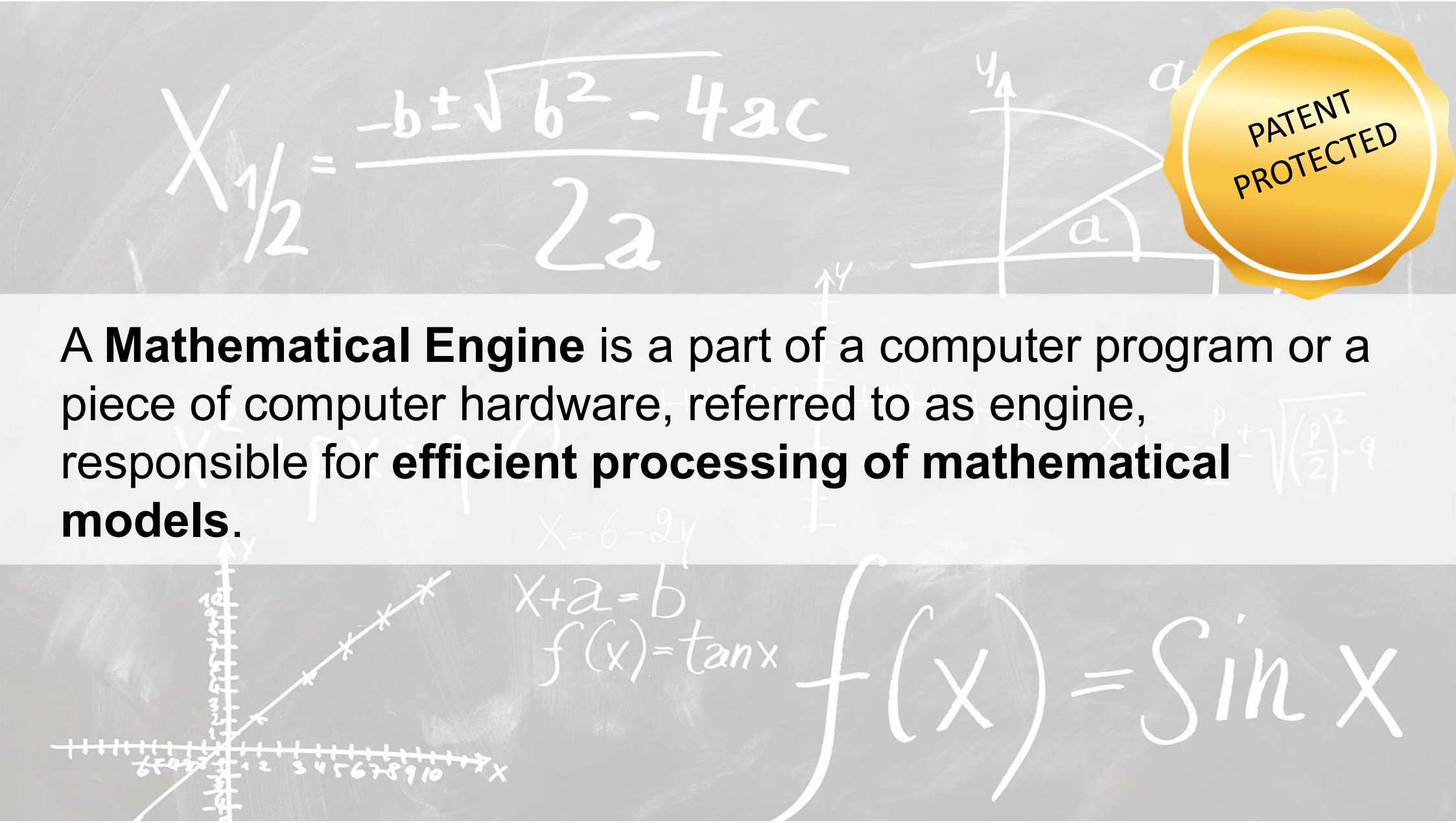
Mathematical Engine Motivation

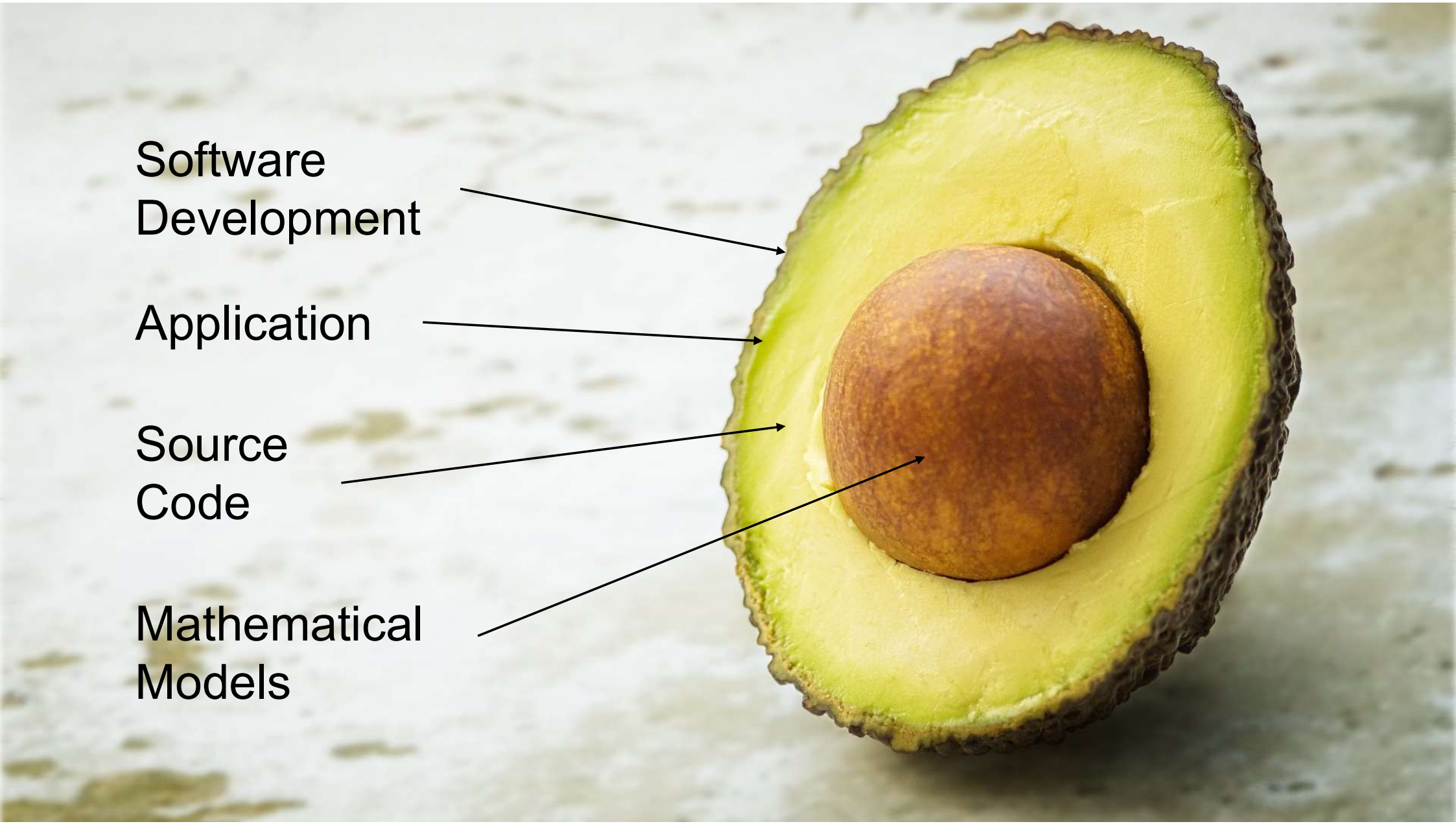
paceval., 2021

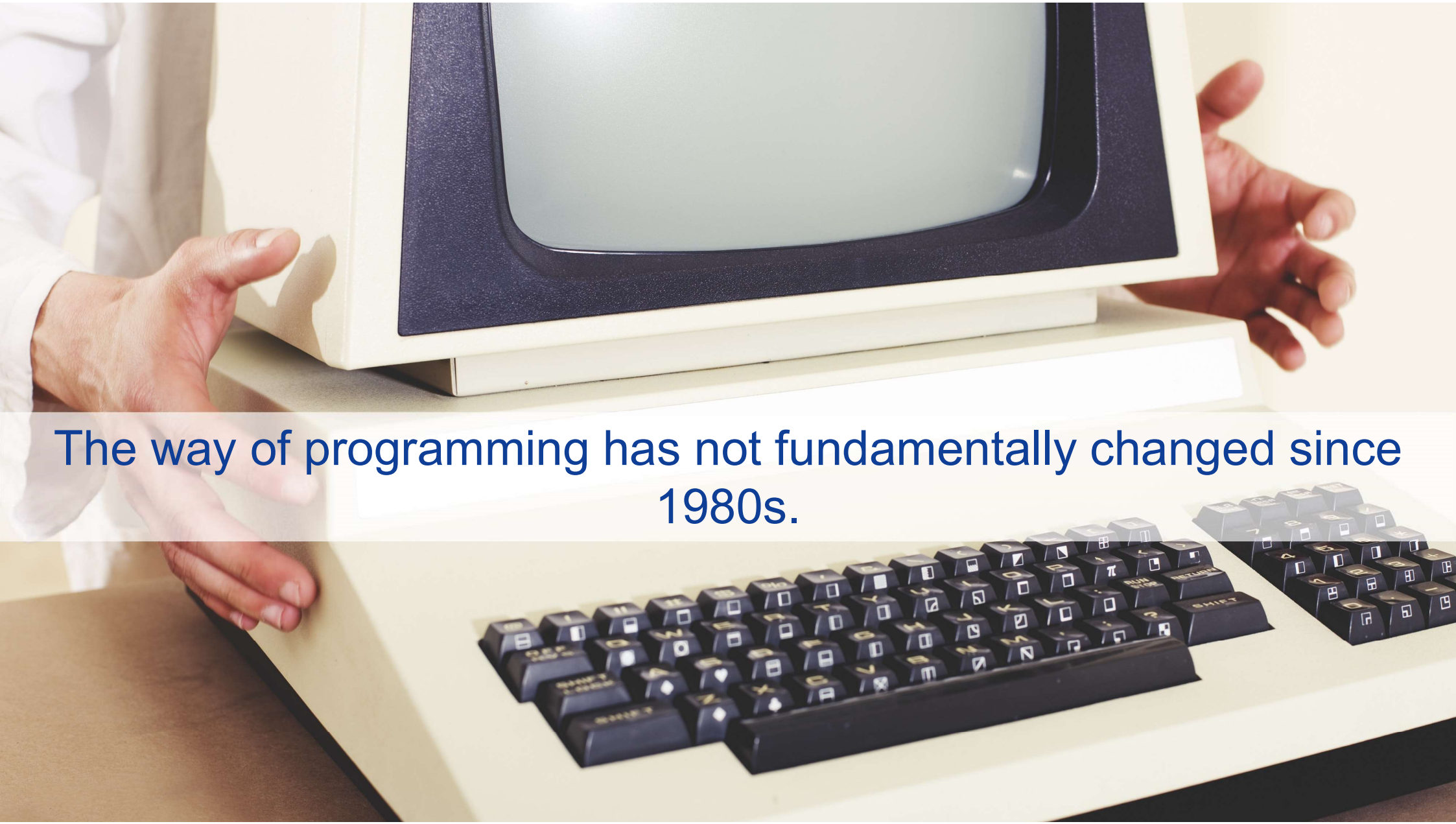


A **Mathematical Model** is an abstraction of a real-life scenario, system or event that uses **mathematical language to describe and predict** the behavior, dynamics and evolution of said scenario, system or event.

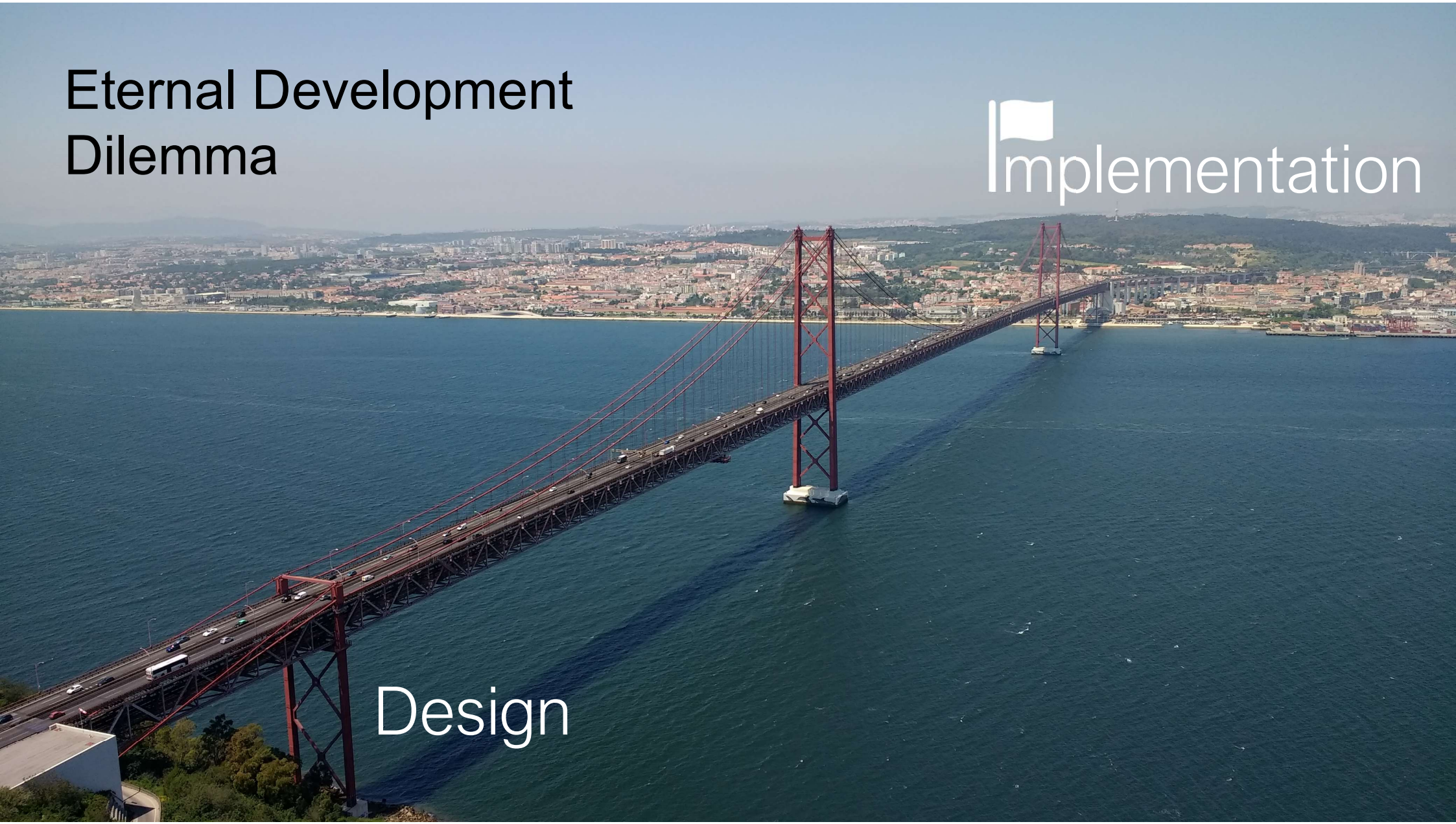


A **Mathematical Engine** is a part of a computer program or a piece of computer hardware, referred to as engine, responsible for **efficient processing of mathematical models**.


Software
Development
Application
Source
Code
Mathematical
Models



The way of programming has not fundamentally changed since 1980s.


Eternal Development
Dilemma
Implementation
Design

Challenges

A mathematical model must be transparent traceable and demonstrably continuously improvable, without having to be entirely re-qualified.
`[EU legal requirement]`

A mathematical model must be easy to integrate on any hardware and software, and consistently deliver mathematically correct results.
`[simplicity and quality requirement]`

The Principles

an ideal architecture of the mathematical engine

Small in size, system-independent and not intrinsically complex

- quick software updates over the air
- flexible hardware and software options
- faster development time

Complex algorithms and fast decision processes
on input values without a network

- local intelligence,
- energy efficiency
- data security

Separation of complex algorithms and decision processes from the main program

Less time for

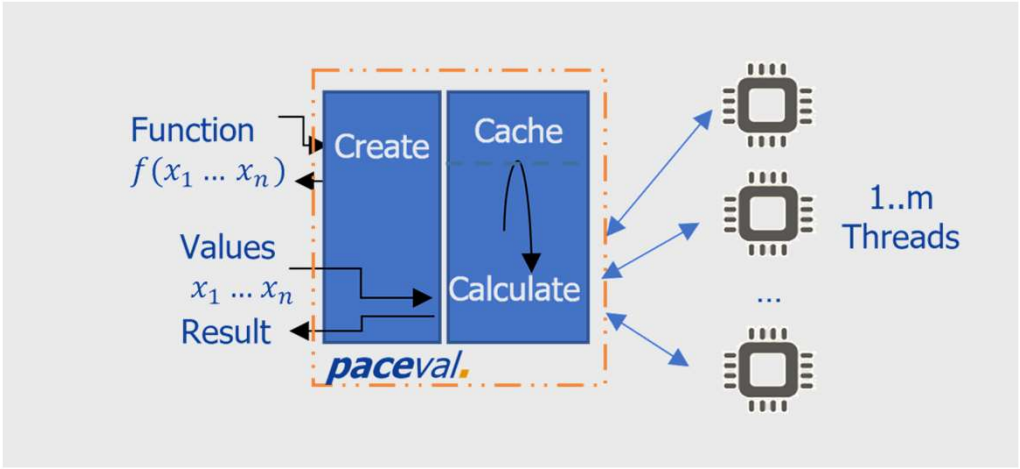
- bug fixing
- verification
- certification

Mathematical precision and safety

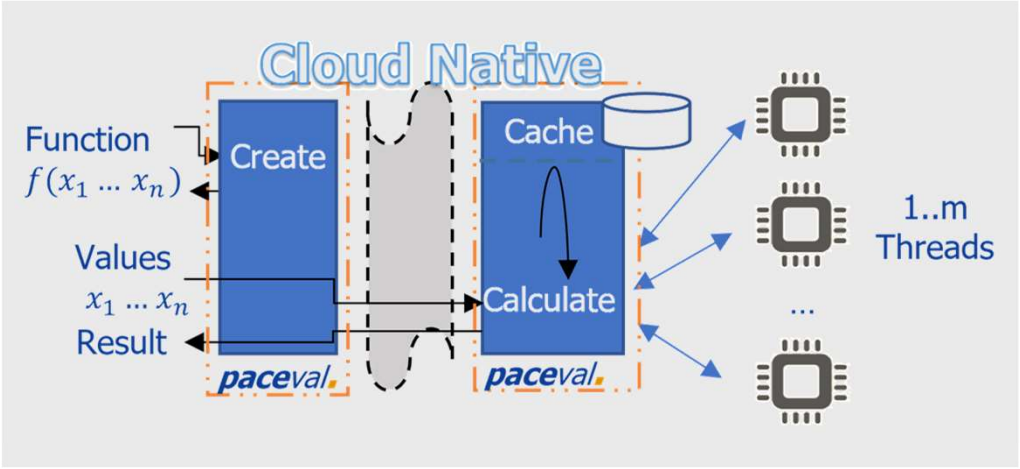
Prevents contradictions
during implementation

Mathematical Engine

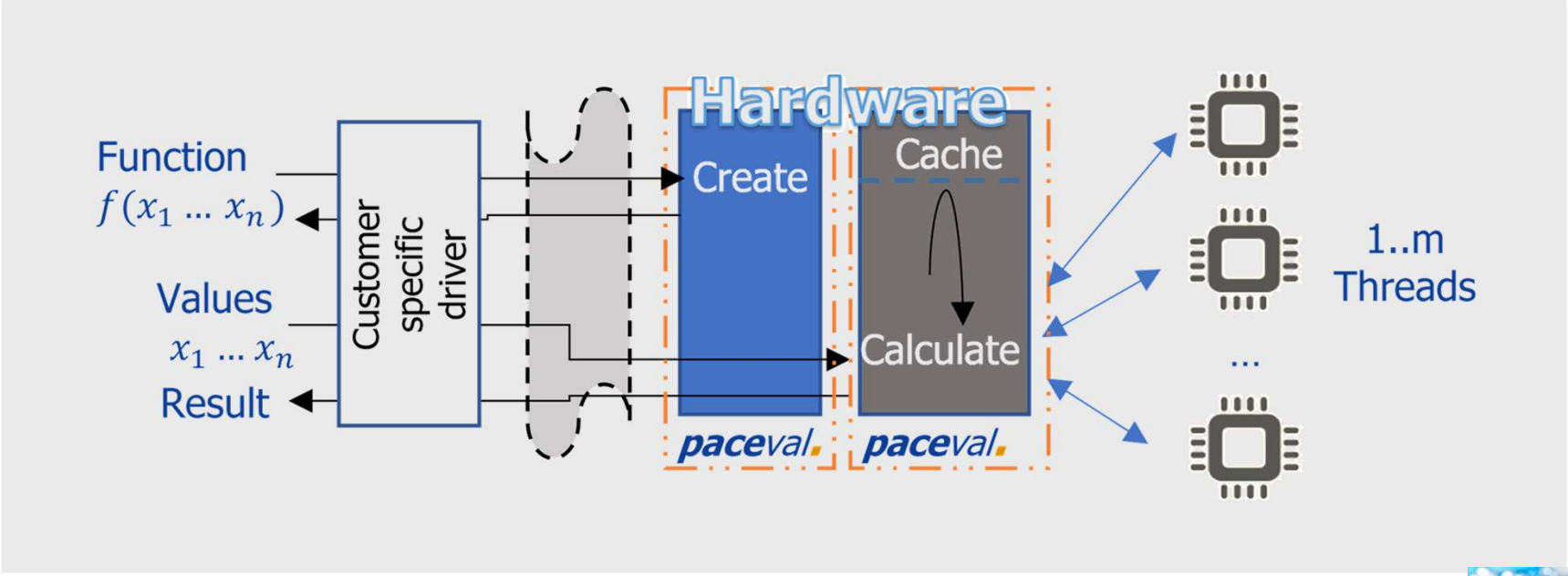
Software mathematical engine

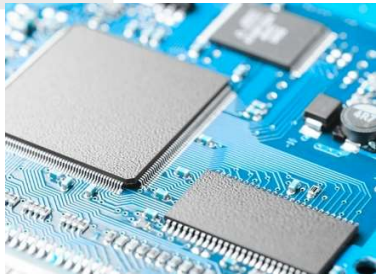


Cloud based mathematical engine



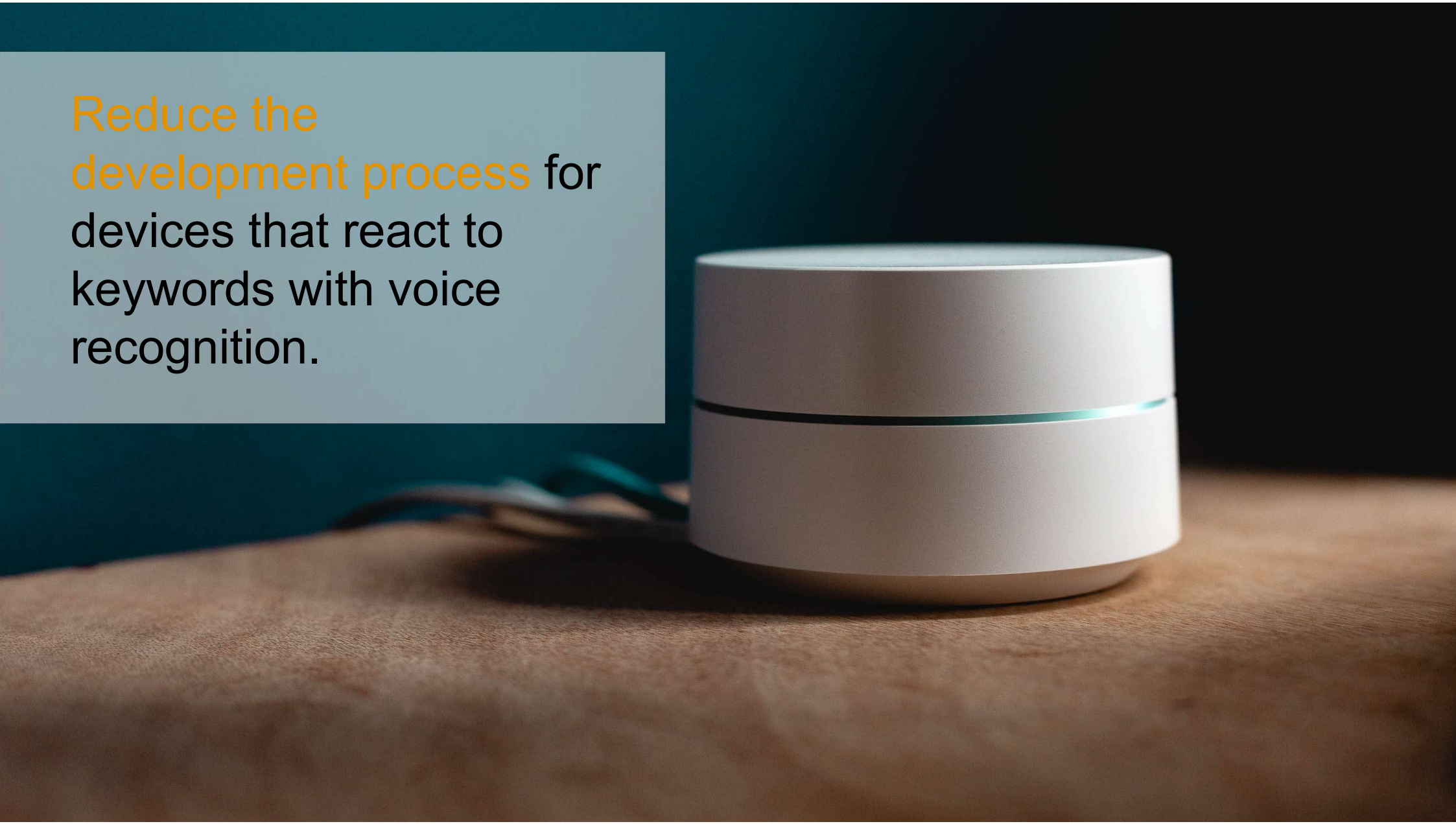
Mathematical Engine in Hardware





Use cases

and advantages


Reduce the development process for devices that react to keywords with voice recognition.


Reduce power consumption for devices that
use cameras to identify objects or persons


Create
local intelligence
on independent
systems

Features

- **easy integration of mathematics:** easy-to-read and write textual declarations in standard math notations; automated error handling
- **fast maintenance and requalification:** clear readable and maintainable algorithms in the source code
- **universal programming interface** adaptable and integrable for every development environment (operating system / programming language) since 1995
- **interface to other tools:** definition of the mathematical logic with external tools with subsequent import / export possible

paceval.

Create value fast.

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